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SENATE

REPORT
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MARINE AND HYDROKINETIC RENEWABLE ENERGY ACT

DECEMBER 10, 2014.—Ordered to be printed

Ms. LANDRIEU, from the Committee on Energy and Natural Resources, submitted the following

R E P O R T

[To accompany S. 1419]

The Committee on Energy and Natural Resources, to which was referred the bill (S. 1419) to promote research, development, and demonstration of marine and hydrokinetic renewable energy technologies, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill, as amended, do pass.

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Marine and Hydrokinetic Renewable Energy Act of 2014".

(b) TABLE OF CONTENTS.—The table of contents of this Act is as follows:

TITLE I—MARINE AND HYDROKINETIC RENEWABLE ENERGY TECHNOLOGIES

SEC. 101. DEFINITION OF MARINE AND HYDROKINETIC RENEWABLE ENERGY.

Section 632 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17211) is amended in the matter preceding paragraph (1) by striking "electrical".

SEC. 102. MARINE AND HYDROKINETIC RENEWABLE ENERGY RESEARCH AND DEVELOPMENT.

Section 633 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17212) is amended to read as follows:

"SEC. 633. MARINE AND HYDROKINETIC RENEWABLE ENERGY RESEARCH AND DEVELOPMENT.

"The Secretary, in consultation with the Secretary of the Interior, the Secretary of Commerce, and the Federal Energy Regulatory Commission, shall carry out a program of research, development, demonstration, and commercial application to accelerate the introduction of marine and hydrokinetic renewable energy production into the United States energy supply, giving priority to fostering accelerated research, development, and commercialization of technology, including programs—

"(1) to assist technology development to improve the components, processes, and systems used for power generation from marine and hydrokinetic renewable energy resources;

"(2) to establish critical testing infrastructure necessary—

"(A) to cost effectively and efficiently test and prove marine and hydrokinetic renewable energy devices; and

"(B) to accelerate the technological readiness and commercialization of those devices;

"(3) to support efforts to increase the efficiency of energy conversion, lower the cost, increase the use, improve the reliability, and demonstrate the applicability of marine and hydrokinetic renewable energy technologies by participating in demonstration projects;

"(4) to investigate variability issues and the efficient and reliable integration of marine and hydrokinetic renewable energy with the utility grid;

"(5) to identify and study critical short- and long-term needs to create a sustainable marine and hydrokinetic renewable energy supply chain based in the United States;

"(6) to increase the reliability and survivability of marine and hydrokinetic renewable energy technologies;

"(7) to verify the performance, reliability, maintainability, and cost of new marine and hydrokinetic renewable energy device designs and system components in an operating environment;

"(8) to coordinate and avoid duplication of activities across programs of the Department and other applicable Federal agencies, including National Laboratories and to coordinate public-private collaboration in all programs under this section;

"(9) to identify opportunities for joint research and development programs and development of economies of scale between—

"(A) marine and hydrokinetic renewable energy technologies; and

"(B) other renewable energy and fossil energy programs, offshore oil and gas production activities, and activities of the Department of Defense; and

"(10) to support in-water technology development with international partners using existing cooperative procedures (including memoranda of understanding)—

"(A) to allow cooperative funding and other support of value to be exchanged and leveraged; and

"(B) to encourage the participation of international research centers and companies within the United States and the participation of United States research centers and companies in international projects.".

SEC. 103. NATIONAL MARINE RENEWABLE ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION CENTERS.

Section 634 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17213) is amended by striking subsection (b) and inserting the following:

"(b) PURPOSES.—A Center (in coordination with the Department and National Laboratories) shall—

"(1) advance research, development, demonstration, and commercial application of marine and hydrokinetic renewable energy technologies;

"(2) support in-water testing and demonstration of marine and hydrokinetic renewable energy technologies, including facilities capable of testing—

"(A) marine and hydrokinetic renewable energy systems of various technology readiness levels and scales;

"(B) a variety of technologies in multiple test berths at a single location; and

"(C) arrays of technology devices; and

"(3) serve as information clearinghouses for the marine and hydrokinetic renewable energy industry by collecting and disseminating information on best

practices in all areas relating to developing and managing marine and hydrokinetic renewable energy resources and energy systems.".

SEC. 104. AUTHORIZATION OF APPROPRIATIONS.

Section 636 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17215) is amended by striking "2008 through 2012" and inserting "2015 through 2018".

TITLE II—MARINE AND HYDROKINETIC RENEWABLE ENERGY REGULATORY EFFICIENCY

SEC. 201. MARINE AND HYDROKINETIC RENEWABLE ENERGY PROJECTS AND FACILITIES.

Part I of the Federal Power Act (16 U.S.C. 792 et seq.) is amended by adding at the end the following:

"SEC. 34. PILOT LICENSE FOR MARINE AND HYDROKINETIC RENEWABLE ENERGY PROJECTS.

"(a) DEFINITION OF HYDROKINETIC PILOT PROJECT.—

"(1) IN GENERAL.—In this section, the term 'hydrokinetic pilot project' means a facility that generates energy from—

"(A) waves, tides, or currents in an ocean, estuary, or tidal area; or

"(B) free-flowing water in a river, lake, or stream.

"(2) EXCLUSIONS.—The term 'hydrokinetic pilot project' does not include a project that uses a dam or other impoundment for electric power purposes.

"(b) PILOT LICENSES AUTHORIZED.—The Commission may issue a pilot license to construct, operate, and maintain a hydrokinetic pilot project that meets the criteria listed in subsection (c).

"(c) LICENSE CRITERIA.—The Commission may issue a pilot license for a hydrokinetic pilot project if the project—

"(1) will have an installed capacity of not more than 10 megawatts;

"(2) is for a term of not more than 10 years;

"(3) will not cause a significant adverse environmental impact or interfere with navigation;

"(4) is removable and can shut down on reasonable notice in the event of a significant adverse safety, navigation, or environmental impact;

"(5) can be removed, and the site can be restored, by the end of the license term, unless the project has obtained a new license or the Commission has determined, based on substantial evidence, that the project should not be removed because it would be preferable for environmental or other reasons not to; and

"(6) is primarily for the purpose of—

"(A) testing new hydrokinetic technologies, both single devices and in arrays of devices;

"(B) locating appropriate sites for new hydrokinetic technologies; or

"(C) determining the environmental and other effects of a hydrokinetic technology.

"(d) LEAD AGENCY.—In carrying out this section, the Commission shall act as the lead agency—

"(1) to coordinate all applicable Federal authorizations; and

"(2) to comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

"(e) SCHEDULE GOALS.—

"(1) IN GENERAL.—Not later than 30 days after the date on which the Commission receives a completed application, and following consultation with Federal, State, and local agencies with jurisdiction over the hydrokinetic pilot project, the Commission shall develop and issue pilot license approval process scheduling goals that cover all Federal, State, and local permits required by law.

"(2) COMPLIANCE.—Applicable Federal, State, and local agencies shall comply with the goals established under paragraph (1) to the maximum extent practicable, consistent with applicable law.

"(3) 1-YEAR GOAL.—It shall be the goal of the Commission and the other applicable agencies to complete the pilot license process by not later than 1 year after the date on which the Commission receives the completed application.

"(f) SIZE LIMITATION.—For proposed projects located in an estuary, tidal area, river, lake, or stream, the Commission shall determine the size limit on a case-by-case basis, taking into account all relevant factors.

"(g) EXTENSIONS AUTHORIZED.—On application by a project, the Commission may make a 1-time extension of a pilot license for a term not to exceed 5 years.".

PURPOSE

The purpose of S. 1419 is to promote research, development, and demonstration of marine and hydrokinetic renewable energy technologies.

BACKGROUND AND NEED

Marine hydrokinetic renewable energy (MHK) is a form of hydropower that generates energy from free-flowing waters, such as waves, currents, an estuary, or a tidal area, as well as from the free-flowing water in a river, lake, or stream. MHK differs from conventional hydropower in that it generates energy without the use of a dam or other impoundment.

The United States has not been a world leader in the development of cutting edge MHK technologies to date. Instead, the United States, with its significant wave, tidal, current, and in-stream energy resource potential serves as a potential market for its international competitors in this new industrial sector. The Electric Power Research Institute has estimated that the commercially available wave energy potential off the coast of the United States is roughly 252 million megawatt hours—equal to 6.5 percent of today's entire generating portfolio. This is approximately the amount of electricity presently being produced by the existing domestic fleet of conventional hydroelectric dams.

MHK has potential to generate a substantial amount of clean renewable energy in the United States and across the globe. It is poised to be a key participant in the transition to a low carbon economy and has the potential to be part of an "all of the above" energy strategy. However, to date there has been no successful commercial development of MHK in the United States due to technological and regulatory cost barriers.

S. 1419 is intended to help commercialize MHK technologies through research and development and put in place a more efficient and timely regulatory process for the siting of pilot projects intended to demonstrate the viability of these technologies.

LEGISLATIVE HISTORY

S. 1419 was introduced by Senator Wyden on August 1, 2013. Senators Murkowski, King, Merkley, and Schatz are cosponsors.

The Subcommittee on Water and Power held a hearing on S. 1419 on February 27, 2014 (S. Hrg. 113–284). The Committee adopted an amendment in the nature of a substitute and ordered S. 1419, as amended, reported favorably on November 13, 2014.

COMMITTEE RECOMMENDATION

The Senate Committee on Energy and Natural Resources, in open business session on November 13, 2014, by a voice vote of a quorum present, recommends that the Senate pass S. 1419, if amended as described herein. Senator Barrasso asked to be recorded as voting no.

COMMITTEE AMENDMENT

During its consideration of S. 1419, the Committee adopted an amendment in the nature of a substitute containing technical changes to the bill.

SECTION-BY-SECTION ANALYSIS

Section 1 contains the Act's short title, the "Marine and Hydrokinetic Renewable Energy Act of 2014," and sets forth the bill's table of contents.

Section 101 amends the definition of marine and hydrokinetic (MHK) renewable energy in section 632 of the Energy Security and Independence Act of 2007 to include all forms of energy, not solely electricity.

Section 102 amends section 633 of the Energy Security and Independence Act of 2007 to authorize the Secretary of Energy, in consultation with the Secretary of the Interior, the Secretary of Commerce, and the Federal Energy Regulatory Commission (FERC) to carry out a program of MHK research, development, demonstration and commercial application to accelerate the introduction of MHK energy production to the U.S. energy supply.

Section 103 amends section 634 of the Energy Security and Independence Act of 2007 to provide that any National Marine Renewable Energy Research, Development, and Demonstration Center (Center) shall advance research and development, demonstration, and commercial application of a wide range of MHK renewable energy technologies types and scales through in-water testing and other means. It adds a new section 634(b)(3) to require centers Center to also serve as information clearinghouses for the MHK industry.

Section 104 amends section 636 of the Energy Security and Independence Act of 2007 to authorize funding of up to $50 million per year for fiscal years 2015 through 2018 for the Department of Energy's MHK research and development program.

Section 201 adds a new section 34 to part 1 of the Federal Power Act. Subsection (b) of the new section 34 authorizes FERC to issue a pilot license to construct operate and maintain an MHK pilot project that has a capacity of no more than 10 MW. Subsection (c) establishes licensing criteria for MHK projects. The criteria provide for a term of not more than 10 years (with a possible one-time extension of up to five years) and require that the project will not cause a significant adverse environmental impact or interfere with navigation, be removable and be capable of shutting down on reasonable notice; and be primarily for the purpose of testing, locating appropriate sites, or determining the technology's environmental effects. Subsection (d) provides that the FERC will be the lead agency for the purposes of compliance with the National Environmental Policy Act. Subsection (e) establishes the scheduling goal that the FERC and other regulatory agencies complete the pilot license process by not later than one-year after receipt of a complete application.

COST AND BUDGETARY CONSIDERATIONS

The following estimate of costs of this measure has been provided by the Congressional Budget Office.

S. 1419—Marine and Hydrokinetic Renewable Energy Act of 2014

Summary: S. 1419 would authorize appropriations for activities aimed at promoting the development of marine and hydrokinetic energy devices that produce energy from moving water. The bill also would authorize the Federal Energy Regulatory Commission (FERC) to issue licenses for pilot projects to test new hydrokinetic technologies.

Assuming appropriation of the authorized amounts, CBO estimates that implementing S. 1419 would cost $192 million over the 2015 2019 period. Pay-as-you-go procedures do not apply to this legislation because it would not affect direct spending or revenues.

S. 1419 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary effect of S. 1419 is shown in the following table. The costs of this legislation fall within budget function 270 (energy).

	By fiscal year, in millions of dollars—					
	2015	2016	2017	2018	2019	2015 2019
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Authorization Level	50	50	50	50	0	200
Estimated Outlays	12	30	50	50	50	192

Basis of estimate: S. 1419 would authorize the appropriation of $50 million a year over the 2015 2018 period for the Department of Energy (DOE) to promote research, development, and commercial application of marine and hydrokinetic energy devices. In 2014, DOE received $41 million for activities aimed and promoting such technologies. Based on historical spending patterns for such activities, CBO estimates that implementing S. 1419 would cost $192 million over the 2015 2019 period, assuming appropriation of the authorized amounts.

CBO estimates that authorizing FERC to issue licenses for pilot projects to test marine and hydrokinetic technologies would have no significant net impact on the federal budget. CBO anticipates that issuing such licenses would affect FERC's workload; however, because FERC recovers 100 percent of its costs through user fees, any change in that agency's costs (which are controlled through annual appropriation acts) would be offset by an equal change in fees that the commission charges, resulting in no net change in federal spending.

Pay-As-You-Go considerations: None.

Intergovernmental and private-sector impact: S. 1419 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

Estimate prepared by: Federal costs: Megan Carroll; Impact on state, local, and tribal governments: Jon Sperl; Impact on the private sector: Amy Petz.

Estimate approved by: Theresa Gullo, Deputy Assistant Director for Budget Analysis.

REGULATORY IMPACT EVALUATION

In compliance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee makes the following evaluation of the regulatory impact which would be incurred in carrying out S. 1419.

The bill is not a regulatory measure in the sense of imposing Government-established standards or significant economic responsibilities on private individuals and businesses.

No personal information would be collected in administering the program. Therefore, there would be no impact on personal privacy.

Little, if any, additional paperwork would result from the enactment of S. 1419, as ordered reported.

CONGRESSIONALLY DIRECTED SPENDING

S. 1419, as reported, does not contain any congressionally directed spending items, limited tax benefits, or limited tariff benefits as defined in rule XLIV of the Standing Rules of the Senate.

EXECUTIVE COMMUNICATIONS

The testimony provided by Mike Carr, Senior Advisor to the Director, Energy Policy and Systems Analysis and Principal Deputy Assistant Secretary, Office of Energy Efficiency and Renewable Energy, Department of Energy, and John Katz, Deputy Associate General Counsel for Energy Projects, Federal Energy Regulatory Commission, at the February 27, 2014, Subcommittee on Water and Power hearing on S. 1419 follows:

WRITTEN STATEMENT OF MIKE CARR, SENIOR ADVISOR TO THE DIRECTOR, ENERGY POLICY AND SYSTEMS ANALYSIS AND PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

INTRODUCTION

Chairman Schatz, Ranking Member Lee, and members of the Subcommittee, thank you for the opportunity to testify on behalf of the U.S. Department of Energy (DOE) on S. 1419, the Marine and Hydrokinetic Renewable Energy Act of 2013.

The Department is still reviewing S. 1419 and therefore does not have a position on the bill at this time. S. 1419 would authorize the Department to perform research and development on marine and hydrokinetic (MHK) technology components, materials, and systems in order to improve performance, increase survivability, and drive down the technology's cost. S. 1419 would authorize the Department to develop appropriate testing infrastructure and support demonstrations of MHK energy technologies to verify their performance and cost. The legislation also would expand the authorized role of National Marine Renewable Energy Research, Development, and Demonstration Centers to include in-water testing and demonstration of MHK technologies.

BACKGROUND

DOE is pursuing an all-of-the-above approach to developing every source of American energy. The Office of Energy Efficiency and Renewable Energy leads DOE's efforts to help build a strong clean energy economy, a strategy that is aimed at reducing our reliance on oil, saving families and businesses money, creating jobs, and reducing pollution. We support research, development, and demonstration (RD&D) of cutting-edge technologies in sustainable transportation, energy efficiency, and renewable electricity generation, including both hydropower and MHK technologies. The Department supports the goals of ensuring United States leadership in innovating, validating, and manufacturing MHK technologies domestically, as well as deploying these technologies sustainably in order to harness the energy potential of our various water resources while building a clean energy economy.

The Water Power Program has recently completed comprehensive resource assessments that identify the potential of the nation's waves, as well as tidal, ocean, and river currents. These resource assessments estimate that the technically extractable resource potential is almost 900 TWh/yr for wave energy [1] and under 400 TWh/yr for tidal [2] and ocean current,[3] which represents up to 25 percent of projected U.S. generation needs by 2050. With more than 50 percent of the population living within 50 miles of coastlines, there is significant potential to provide clean, renewable electricity to communities and cities in these coastal regions using marine and hydrokinetic technologies. MHK technologies can more readily compete in the near term in coastal regions with higher average electricity prices, and close proximity of coastal populations to water resources reduces transmission distances. There are potentially many different ways that we can sustainably develop our water resources for energy and the Department is committed to helping identify new opportunities for developing renewable energy resources.

Since DOE restarted its Water Power Program in fiscal year 2008, the Program has made significant strides in advancing next-generation water power technologies that can extract energy from moving water, including waves and currents in oceans, rivers, and tidal areas; assessing existing resources; promoting deployment opportunities; and developing this resource in an environmentally responsible manner.

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[1] Reprocessed at 100 meter depth data from P. Jacobson, G. Hagerman, and G. Scott, "Mapping and Assessment of the United States Ocean Wave Energy Resource," Electric Power Research Institute, Report Number 1024637, 2011.

[2] K. Haas, H. Fritz, S. French, B. Smith, and V. Neary, "Assessment of Energy Production Potential from Tidal Streams in the United States," Georgia Tech Research Corporation, 2011 Upper bound derives from variation on assumptions in numerical models used.

[3] K. Haas, H. Fritz, S. French, and V. Neary, "Assessment of Energy Production Potential from Ocean Currents Along the United States Coastlines," Georgia Tech Research Corporation, 2013 Upper bound derives from variation on assumptions in the numerical models used, and represents Gulistream from FL to NC.

Fostering a domestic MHK industry requires strategic investments in research, development, testing, and demonstration to drive down the cost and improve the performance of the most promising and cost-competitive technologies. The Department plans to invest $41.3 million in fiscal year 2014 to promote MHK technology development and testing in laboratory and open-water settings, while gathering the operational, environmental, and cost data needed to accelerate the responsible deployment and commercialization of MHK technologies.

Furthermore, like all energy development, MHK deployment requires ensuring that our water, ecological, and marine life resources are protected. I will address these broad areas in turn.

RESEARCH AND DEVELOPMENT

The levelized cost of energy (LCOE) of today's wave energy devices is between 61 and 77 cents per kilowatt-hour (0/kWh), and is between 47 and 53 0/kWh for tidal stream energy devices.[4] The MHK subprogram goal is to achieve cost-competitiveness at local coastal hurdle rates, which is approximately 12 to 15 0/kWh by 2030. The Program has developed detailed cost models for six different MHK device designs using performance simulations and small-scale laboratory tests for validation. To build on these cost models and clearly identify cost reduction pathways, the Program is identifying research and development opportunities to reduce the LCOE for MHK devices, supporting a detailed, internal techno-economic assessment of MHK technologies and helping stakeholders identify research and development gaps to achieve cost-competitive energy rates by 2030. Using data from internal techno-economic MHK assessment, the Department has established baseline costs for the technology to better inform MHK RD&D activities.

Research activities enable the development of innovative technologies and improve the reliability and technology readiness of MHK systems. DOE currently supports systems and performance advancement projects to develop new drivetrain, generator and structural components as well as develop software that predicts ocean conditions and adjusts device settings accordingly to optimize power production. One example includes innovative components with cross-platform applicability, such as simplified drivetrain designs that will eliminate costly and unreliable gearboxes and hydraulics by utilizing permanent magnet and linear direct-drive generators. DOE also researches ways to improve the technology's survivability, like innovative corrosion resistant materials, such as composites, which can lower repairs and reduce operations and maintenance costs.

[4] "The Carbon Trust, Accelerating Marine Energy," July 2011: *http:www/carbontrust.com/resources/reports/technology/accelerating-marine-energy.*

TESTING AND DEMONSTRATION

DOE has invested in three National Marine Renewable Energy Centers. These Centers are geographically diverse, offering testing sites for a wide range of MHK technology types in different water conditions and climates, to help validate technology performance and identify and address technology deficiencies early in the development cycle. Recently, the Northwest National Marine Renewable Energy Center, led jointly by Oregon State University and the University of Washington, launched the Ocean Sentinel, a mobile instrumentation buoy to support ocean testing that obtains critical technical and cost performance data for a variety of wave energy technologies.

Additionally, the Water Power Program is focused on making strategic investments in transformative technologies, including systems demonstration for advanced MHK industry projects like wave energy converter technologies. By supporting in-water demonstrations, the Program will have the opportunity to evaluate the entire process from demonstration inception to completion, validating construction, generation, and operating expenses and informing the investor community on the status and progress of MHK systems. Between fiscal year 2011 and fiscal year 2013, the Program cost-shared the testing of 10 MHK devices in open-water environments, and the testing of 8 MHK devices in test tanks in controlled conditions. These demonstrations have greatly increased our knowledge and understanding of device performance and their interaction with the environment. This important demonstration work helps to advance the commercial readiness of full-scale MHK technologies, like the first-ever grid-connected tidal power device in the United States in Cobscook Bay, Maine, now delivering enough electricity to the utility grid to alone power 25 to 30 homes annually.

DEVELOPING MHK RESOURCES SUSTAINABLY

EERE's MHK subprogram pursues market acceleration and deployment activities that address key environmental and ecological uncertainties, which DOE believes currently represent the most significant barrier to rapid and efficient permitting and licensing of new demonstrations or commercial projects. In fiscal year 2014, DOE plans to invest $5 million in activities that support a range of environmental studies and tool development to ensure that energy generated from MHK is not only renewable, but environmentally sustainable. This includes the development of instrumentation, associated processing tools, and integration of instrumentation packages for quickly and cost-effectively conducting environmental monitoring of MHK technologies. Additionally, DOE is an active member of the International Energy Agency's Ocean Energy Systems group and recently collaborated with international partners to create the Tethys database, which catalogues and shares environmental research and monitoring information

from around the world to enable sustainable development and expansion of clean, renewable ocean and offshore wind power. For the past four years, DOE has also served as the convener of the Federal Renewable Ocean Energy Working Group to discuss issues of importance, including environmental considerations, amongst relevant federal agencies.

CONCLUSION

In conclusion, I would like to thank you for the opportunity to testify on S. 1419 and on DOE's work to advance MHK technologies. The Department's goals are to help build a viable domestic MHK industry and secure a supply of efficient clean energy from our water resources by supporting innovations enabling cutting-edge MHK technology, testing and demonstration of these technologies, and tools and analysis to ensure we develop our marine and hydrokinetic resources sustainably. I look forward to working with this Subcommittee and with Congress to ensure United States leadership in this industry and to enable the deployment of this source of clean energy.

TESTIMONY OF JOHN KATZ,

Deputy Associate General Counsel,
Federal Energy Regulatory Commission

Chairman Schatz, Ranking Member Lee, and Members of the Subcommittee:

My name is John Katz, Deputy Associate General Counsel for Energy Projects, Federal Energy Regulatory Commission. I appreciate the opportunity to appear before you to discuss S. 1419, the Marine and Hydrokinetic Renewable Energy Act. As a member of the Commission's staff, the views I express in this testimony are my own, and not necessarily those of the Chairman or of any individual Commissioner.

I. BACKGROUND

Pursuant to Part I of the Federal Power Act (FPA), the Federal Energy Regulatory Commission authorizes and regulates non-federal hydropower projects. FPA section 4(e) provides that the Commission may issue licenses for hydropower project works located across, along, from, or in any of the streams over which Congress has jurisdiction under its commerce clause authority, and on any part of the public lands and reservations of the United States. FPA section 23(b) makes it unlawful (with exceptions not relevant here) for any person, state, or municipality, for the purpose of developing electric power, to construct hydropower project works on the navigable waters of the United States, on non-navigable waters over which Congress has Commerce Clause jurisdiction, on public lands or reservations, or using surplus water or power from any government dam, except pursuant to a license issued by the Commission.

Under the FPA, the Commission regulates over 1,600 hydropower projects at over 2,500 dams. Together, these projects represent 54 gigawatts of hydropower capacity, more than halt' of all the hydropower in the United-States. Hydropower is an essential part of the Nation's energy mix and offers the benefits of an emission-free, renewable, domestic energy source with public and private capacity together totaling about nine percent of the U.S. electric generation capacity.

During the last decade, there has been increasing interest in developing projects using new technology that produces electricity utilizing waves or the flow of water in ocean currents, tides, or inland waterways. These are referred to as marine and hydrokinetic projects. By early 2007, the Commission had received more than 50 applications for preliminary permits to study such projects, and had held a technical conference with respect to the development of these new technologies. The Commission then issued an interim policy statement with respect to its review of marine and hydrokinetic preliminary permit applications.

In 2008, Commission staff issued guidance on licensing marine and hydrokinetic pilot projects. The guidance discussed the issuance, under the Commission's existing authority and regulations, of five-year pilot licenses to enable developers to study and test new technology. Pilot project licenses would be for projects that were small, short-term, not located in environmentally sensitive areas, would be able to be shut down on short notice, and would be removed at the end of the pilot license term, unless a new license was granted at that time. Applicants would be required to consult with affected federal, state, and local resource agencies, Indian tribes, non-govemmental agencies, and members of the public.

Since the issuance of the Commission policy statement and staff guidance, Commission staff has worked closely with project developers and other stakeholders to explore the development of marine and hydrokinetic projects. There are currently 11 preliminary permits in effect for marine and hydrokinetic projects. To date, the Commission has licensed six marine and hydrokinetic projects, three of which were pilot projects, and is reviewing one application for a pilot tidal project.

II. S. 1419

Section 102 of S. 1419 provides that the Secretary of Energy, in consultation with the Secretary of the Interior, the Secretary of Commerce, and the Commission, shall carry out a program of research, development, demonstration, and commercial application to expand marine and hydrokinetic renewable energy production. While the Commission is not authorized or funded to engage in research, development, or commercial application activities, Commission staff is prepared to assist the Secretary, as appropriate, in these matters.

Section 103 of S. 1419 provides for the development, under the Secretary of Energy, of national marine renewable energy research, development, and demonstration centers. Commission staff has discussed such centers with staff at the Department of Energy and believes that the centers could provide important support for the development of marine and hydrokinetic technology. Because the FPA requires that projects developed by private entities, states, and municipalities that are located in the navigable waters be licensed by the Commission, Commission staff believes that a regime in which the test centers would be owned by the Department of Energy would be preferable, so that testing would not require Commission authorization.

Section 201 of S. 1419 would amend the FPA to authorize the Commission to issue pilot project licenses under specified criteria. As noted, the Commission has already issued pilot project licenses and Commission staff has developed guidance with respect to such licenses, under the assumption that the FPA currently provides authority for the Commission to do so. No entity has to date suggested that these actions are beyond the scope of the FPA. However, it is up to Congress to determine whether the Commission should be provided with explicit statutory authority in this area. To the extent that section 201 establishes criteria for qualifying pilot projects, Commission staff recommends that project developers and other stakeholders be given the opportunity to present their views on these matters. In addition, Commission staff recommends providing some flexibility in the criteria, given the unlcnowns in developing a new industry.

I would be pleased to answer any questions you may have.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill S. 1419, as ordered reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

PUBLIC LAW 110 140

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TITLE VI—ACCELERATED RESEARCH AND DEVELOPMENT

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Subtitle C—Marine and Hydrokinetic Renewable Energy Technologies

SEC. 631. SHORT TITLE.

This subtitle may be cited as the "Marine and Hydrokinetic Renewable Energy Research and Development Act".

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SEC. 632. DEFINITION.

For purposes of this subtitle, the term "marine and hydrokinetic renewable energy" means [electrical] energy from—

(1) waves, tides and currents in oceans, estuaries, and tidal areas;

(2) free flowing water in rivers, lakes, and streams;

(3) free flowing water in man-made channels; and

(4) differentials in ocean temperature (ocean thermal energy conversion).

* * * * * * *

SEC. 633. MARINE AND HYDROKINETIC RENEWABLE ENERGY RESEARCH AND DEVELOPMENT.

[(a)IN GENERAL.—The Secretary, in consultation with the Secretary of the Interior and the Secretary of Commerce, acting through the Under Secretary of Commerce for Oceans and Atmosphere, shall establish a program of research, development, demonstration, and commercial application to expand marine and hydrokinetic renewable energy production, including programs to—

[(1) study and compare existing marine and hydrokinetic renewable energy technologies;

[(2) research, develop, and demonstrate marine and hydrokinetic renewable energy systems and technologies;

[(3) reduce the manufacturing and operation costs of marine and hydrokinetic renewable energy technologies;

[(4) investigate efficient and reliable integration with the utility grid and intermittency issues;

[(5) advance wave forecasting technologies;

[(6) conduct experimental and numerical modeling for optimization of marine energy conversion devices and arrays;

[(7) increase the reliability and survivability of marine and hydrokinetic renewable energy technologies, including development of corrosive-resistant materials;

[(8) identify, in conjunction with the Secretary of Commerce, acting through the Under Secretary of Commerce for Oceans and Atmosphere, and other Federal agencies as appropriate, the potential environmental impacts, including potential impacts on fisheries and other marine resources, of marine and hydrokinetic renewable energy technologies, measures to prevent adverse impacts, and technologies and other means available for monitoring and determining environmental impacts;

[(9) identify, in conjunction with the Secretary of the Department in which the United States Coast Guard is operating, acting through the Commandant of the United States Coast Guard, the potential navigational impacts of marine and hydrokinetic renewable energy technologies and measures to prevent adverse impacts on navigation;

[(10) develop power measurement standards for marine and hydrokinetic renewable energy;

[(11) develop identification standards for marine and hydrokinetic renewable energy devices;

[(12) address standards development, demonstration, and technology transfer for advanced systems engineering and system integration methods to identify critical interfaces;

[(13) identifying opportunities for cross fertilization and development of economies of scale between other renewable sources and marine and hydrokinetic renewable energy sources; and

[(14) providing public information and opportunity for public comment concerning all technologies.

[(b) REPORT.—Not later than 18 months after the date of enactment of this Act, the Secretary, in conjunction with the Secretary of Commerce, acting through the Undersecretary of Commerce for Oceans and Atmosphere, and the Secretary of the Interior, shall provide to the Congress a report that addresses—

[(1) the potential environmental impacts, including impacts to fisheries and marine resources, of marine and hydrokinetic renewable energy technologies;

[(2) options to prevent adverse environmental impacts;

[(3) the potential role of monitoring and adaptive management in identifying and addressing any adverse environmental impacts; and

[(4) the necessary components of such an adaptive management program.]

The Secretary, in consultation with the Secretary of the Interior, the Secretary of Commerce, and the Federal Energy Regulatory Commission, shall carry out a program of research, development, demonstration, and commercial application to accelerate the introduction of marine and hydrokinetic renewable energy production into the United States energy supply, giving priority to fostering accelerated research, development, and commercialization of technology, including programs—

(1) to assist technology development to improve the components, processes, and systems used for power generation from marine and hydrokinetic renewable energy resources;

(2) to establish critical testing infrastructure necessary—

(A) to cost effectively and efficiently test and prove marine and hydrokinetic renewable energy devices; and

(B) to accelerate the technological readiness and commercialization of those devices;

(3) to support efforts to increase the efficiency of energy conversion, lower the cost, increase the use, improve the reliability, and demonstrate the applicability of marine and hydrokinetic renewable energy technologies by participating in demonstration projects;

(4) to investigate variability issues and the efficient and reliable integration of marine and hydrokinetic renewable energy with the utility grid;

(5) to identify and study critical short- and long-term needs to create a sustainable marine and hydrokinetic renewable energy supply chain based in the United States;

(6) to increase the reliability and survivability of marine and hydrokinetic renewable energy technologies;

(7) to verify the performance, reliability, maintainability, and cost of new marine and hydrokinetic renewable energy device designs and system components in an operating environment;

(8) to coordinate and avoid duplication of activities across programs of the Department and other applicable Federal agencies, including National Laboratories and to coordinate public-private collaboration in all programs under this section;

(9) to identify opportunities for joint research and development programs and development of economies of scale between—

(A) marine and hydrokinetic renewable energy technologies; and

(B) other renewable energy and fossil energy programs, offshore oil and gas production activities, and activities of the Department of Defense; and

(10) to support in-water technology development with international partners using existing cooperative procedures (including memoranda of understanding)—

(A) to allow cooperative funding and other support of value to be exchanged and leveraged; and

(B) to encourage the participation of international research centers and companies within the United States and the participation of United States research centers and companies in international projects.

SEC. 634. NATIONAL MARINE RENEWABLE ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION CENTERS.

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[(b) PURPOSES.—The Centers shall advance research, development, demonstration, and commercial application of marine renewable energy, and shall serve as an information clearinghouse for the marine renewable energy industry, collecting and disseminating information on best practices in all areas related to developing and managing enhanced marine renewable energy systems resources.]

(b) PURPOSES.—A Center (in coordination with the Department and National Laboratories) shall—

(1) advance research, development, demonstration, and commercial application of marine and hydrokinetic renewable energy technologies;

(2) support in-water testing and demonstration of marine and hydrokinetic renewable energy technologies, including facilities capable of testing—

(A) marine and hydrokinetic renewable energy systems of various technology readiness levels and scales;

(B) a variety of technologies in multiple test berths at a single location; and

(C) arrays of technology devices; and

(3) serve as information clearinghouses for the marine and hydrokinetic renewable energy industry by collecting and disseminating information on best practices in all areas relating to developing and managing marine and hydrokinetic renewable energy resources and energy systems.

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SEC. 636. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this subtitle $50,000,000 for each of the fiscal years [2008 through 2012] *2015 through 2018*, except that no funds shall be appropriated under this section for activities that are receiving funds under section 931(a)(2)(E)(i) of the Energy Policy Act of 2005 (42 U.S.C. 16231(a)(2)(E)(i)).

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FEDERAL POWER ACT

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PART I

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SEC. 34. PILOT LICENSE FOR MARINE AND HYDROKINETIC RENEWABLE ENERGY PROJECTS.

(a) DEFINITION OF HYDROKINETIC PILOT PROJECT.—

(1) IN GENERAL.—In this section, the term "hydrokinetic pilot project" means a facility that generates energy from—

(A) waves, tides, or currents in an ocean, estuary, or tidal area; or

(B) free-flowing water in a river, lake, or stream.

(2) EXCLUSIONS.—The term "hydrokinetic pilot project" does not include a project that uses a dam or other impoundment for electric power purposes.

(b) PILOT LICENSES AUTHORIZED.—The Commission may issue a pilot license to construct, operate, and maintain a hydrokinetic pilot project that meets the criteria listed in subsection (c).

(c) LICENSE CRITERIA.—The Commission may issue a pilot license for a hydrokinetic pilot project if the project—

(1) will have an installed capacity of not more than 10 megawatts;

(2) is for a term of not more than 10 years;

(3) will not cause a significant adverse environmental impact or interfere with navigation;

(4) is removable and can shut down on reasonable notice in the event of a significant adverse safety, navigation, or environmental impact;

(5) can be removed, and the site can be restored, by the end of the license term, unless the project has obtained a new license or the Commission has determined, based on substantial evidence, that the project should not be removed because it would be preferable for environmental or other reasons not to; and

(6) is primarily for the purpose of—

(A) testing new hydrokinetic technologies, both single devices and in arrays of devices;

(B) locating appropriate sites for new hydrokinetic technologies; or

(C) determining the environmental and other effects of a hydrokinetic technology.

(d) LEAD AGENCY.—In carrying out this section, the Commission shall act as the lead agency—

(1) to coordinate all applicable Federal authorizations; and

(2) to comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.).

(e) SCHEDULE GOALS.—

(1) IN GENERAL.—Not later than 30 days after the date on which the Commission receives a completed application, and following consultation with Federal, State, and local agencies with jurisdiction over the hydrokinetic pilot project, the Commission shall develop and issue pilot license approval process scheduling goals that cover all Federal, State, and local permits required by law.

(2) COMPLIANCE.—Applicable Federal, State, and local agencies shall comply with the goals established under paragraph (1) to the maximum extent practicable, consistent with applicable law.

(3) 1-YEAR GOAL.—It shall be the goal of the Commission and the other applicable agencies to complete the pilot license process by not later than 1 year after the date on which the Commission receives the completed application.

(f) SIZE LIMITATION.—For proposed projects located in an estuary, tidal area, river, lake, or stream, the Commission shall determine the size limit on a case-by-case basis, taking into account all relevant factors.

(g) EXTENSIONS AUTHORIZED.—On application by a project, the Commission may make a 1-time extension of a pilot license for a term not to exceed 5 years.

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